

## UPWATER – SUPPORT OF SEWAGE PLANTS TO BECOME GREEN

### Problem – Challenge

Climate change, energy crisis, water protection, water scarcity: all these current issues affect wastewater treatment plants (WWTP). WWTP have a much larger greenhouse gas footprint than previously assumed. The decomposition of nitrogen can produce large amounts of nitrous oxide ( $N_2O$ ), a greenhouse gas that is more than 250 times stronger than  $CO_2$ . WWTP must therefore also make their contribution to combating climate change. In addition, WWTP require a lot of energy, which is primarily used to supply bacteria with oxygen to keep the purification process going. This often makes WWTP the largest energy consumers in a municipality and causes correspondingly high energy cost increases. At the same time, water protection is becoming ever important, which will lead to significantly stricter legal requirements. Unfortunately, WWTP cannot solve these upcoming problems with the classical engineering approaches and will therefore face a major upheaval.

### Solution

'upwater' offers measurements and hardware for WWTP to support them in reducing process instabilities, greenhouse gas emissions as well as energy consumption. Off-gas monitoring is a tool for determining direct greenhouse gas emissions (nitrous oxide, methane) and energy consumption (due to oxygen transfer) of the biological stage of a WWTP. With the help of these exhaust air measurements, direct greenhouse gas emissions and energy consumption can be monitored allowing for novel mitigation strategies and energy optimization. The measurement is created and set up by the spin-off. The measurement requires very little maintenance and is fully automatic. Biomonitoring is a novel diagnostic and optimization tool for quasi-real-time monitoring of the micro-biome (totality of all microorganisms), which is essential for the removal of nutrients in a WWTP. This toolset enables the early detection and solution of process problems associated with changes in the structure of the bacterial community. In addition, antibiotic resistance and viruses in wastewater can be monitored.

